Radiological Weapons Myths & Realities

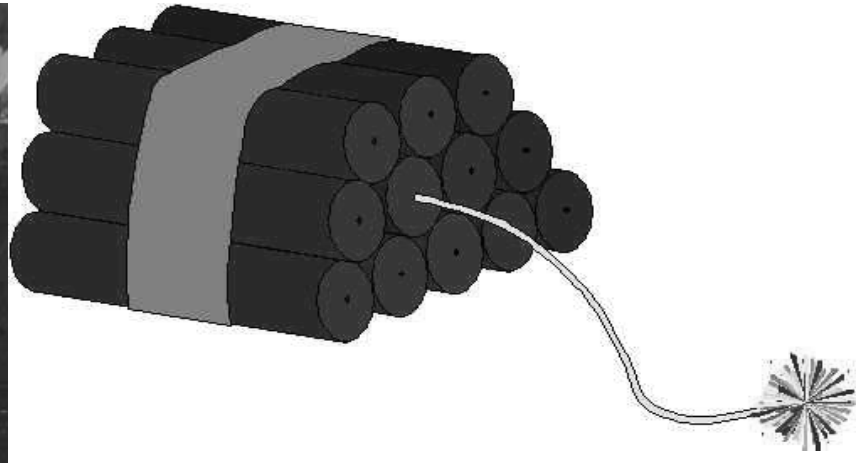
Michael A. Levi

Federation of American Scientists

www.fas.org / ssp@fas.org

Dirty Bombs (RDD)

A dirty bomb combines radiological materials with conventional explosives to spread radioactive material over a city.



Is it Hard to Build a Dirty Bomb?

Myth

Simply detonating conventional explosives near radiological materials yields a dirty bomb.

Is it Hard to Build a Dirty Bomb?

Realities

- In almost all cases, radiological materials must be specially prepared before being used in a dirty bomb
- In particular, a suicide bombing at a radiological facility would be very unlikely to spread radioactive material
- Metal rods would be difficult, though not impossible, to disperse

What are the Most Dangerous Dirty Bomb Materials?

Myth

Enriched uranium and weapons plutonium – the ingredients of nuclear weapons – make the nastiest dirty bombs

What are the Most Dangerous Dirty Bomb Materials?

Realities

- Uranium has very low radioactivity, and is nearly useless in a dirty bomb
- Plutonium is dangerous in a dirty bomb, but weapons plutonium is the least likely source
- Even non-weapons plutonium is not the top dirty bomb threat

Can any Radiological Material be Used in a Dirty Bomb?

Myth

Yes – Medical waste, for example, could be used to make a dirty bomb

Can any Radiological Material be Used in a Dirty Bomb?

Realities

- Most radiological sources are too weak, to short-lived, or too diffuse to be useful in a dirty bomb
- Narrowing down dirty bomb candidates helps us focus our resources

Is Spent Nuclear Fuel Dangerous in a Dirty Bomb?

Myth

Spent nuclear fuel is one of the greatest dirty bomb dangers

Is Spent Nuclear Fuel Dangerous in a Dirty Bomb?

Realities

- It would be nearly impossible for a terrorist to handle highly radioactive spent nuclear fuel
- It would be extremely difficult for a terrorist to disperse radioactive spent nuclear fuel

How Many People Would a Dirty Bomb Kill?

Myth

A dirty bomb could kill thousands

How Many People Would a Dirty Bomb Kill?

Realities

- A dirty bomb would be unlikely to kill anyone beyond the initial conventional blast
- One can simulate radiological releases that would kill thousands; however, these are not realistic dirty bombs

Does a Dirty Bomb Pose any "Real" Danger?

Myth

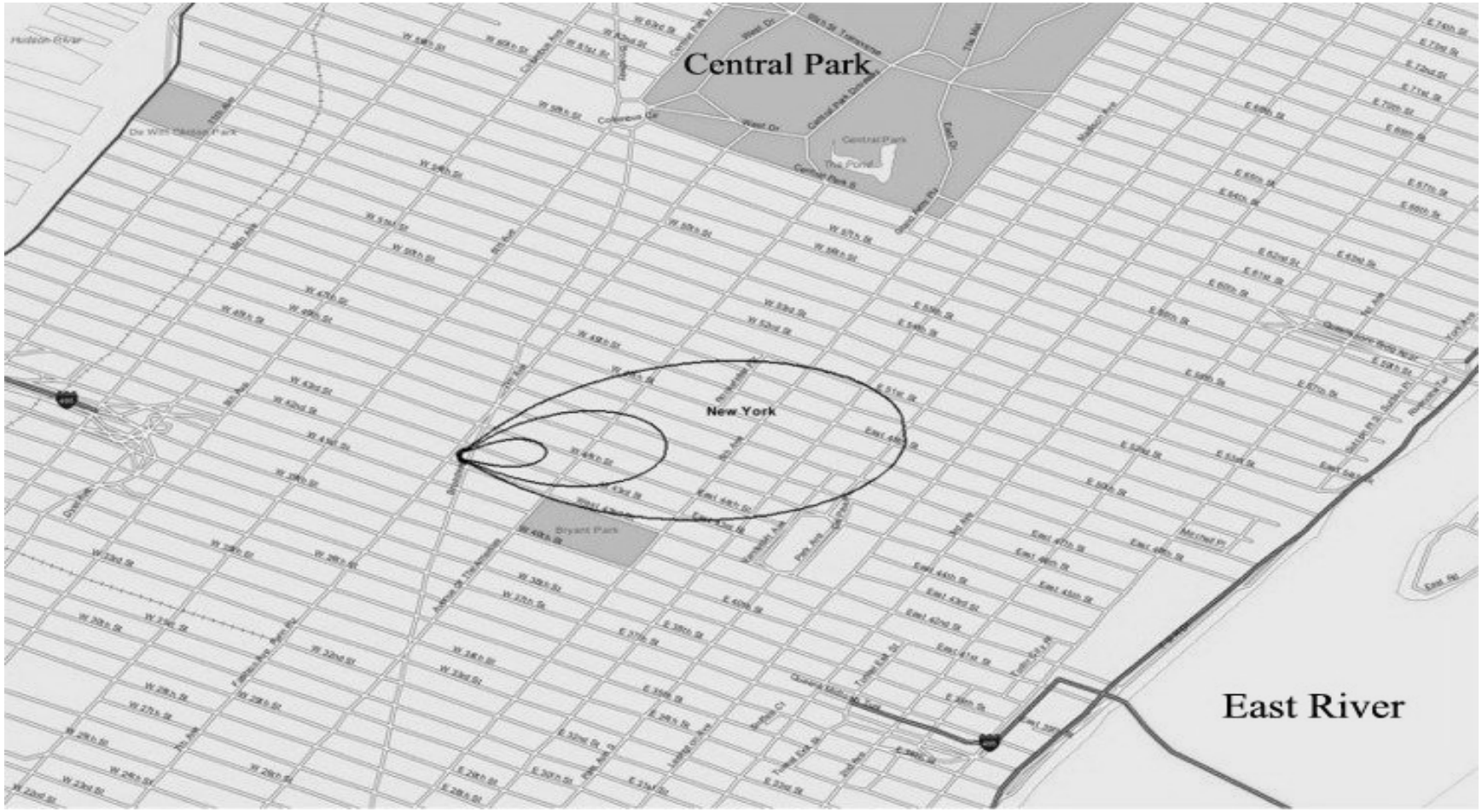
A dirty bomb is strictly a weapon of mass fear. If we can calm fears of radiation, we'll have no problems.

Does a Dirty Bomb Pose any "Real" Danger?

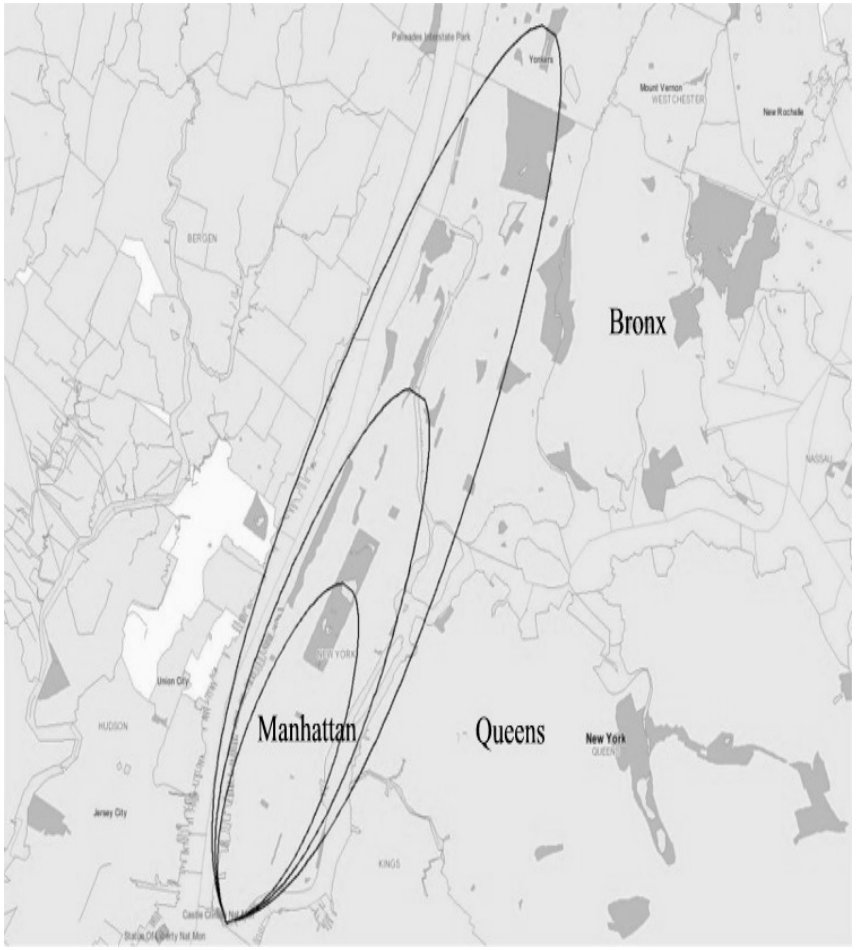
Realities

- That dirty bombs do not pose an immediate hazard does not imply that their contamination does not pose a long term problem.
- A dirty bomb could contaminate large areas beyond the limits of what is safe to inhabit.
- Example: A Russian cesium source could contaminate ten city blocks so that, without decontamination or relocation, cancer rates would double. This would *force* expensive mitigation measures.

Example 1: Small Americium Bomb



Example 2: Large Cobalt Bomb



Is Potassium Iodide (KI) Useful for Protecting Against Dirty Bombs?

Myth

Yes – It protects the body from absorbing radioactive materials

Is Potassium Iodide (KI) Useful for Protecting Against Dirty Bombs?

Realities

- Potassium Iodide protects only against radioactive iodine, which is unlikely to be part of a dirty bomb
- Since there is little immediate hazard, there is no need for an immediate prophylactic.

How Hard is it to Clean Up After a Dirty Bomb Attack?

Myth

Not too hard – we'll just wash down the contaminated surfaces

How Hard is it to Clean Up After a Dirty Bomb Attack?

Realities

- Many materials that might end up in dirty bombs bind chemically to surfaces – they can’t be washed off.
- The sooner you start cleaning up, the easier it will be.
- Decontamination does not neutralize radioactivity – massive waste disposal will likely be required.
- In some cases, abandonment or demolition will be the cheapest solution.

How Hard is it to Detect a Dirty Bomb?

Myth

The more radioactive – and more dangerous – the bomb, the easier it will be to detect

How Hard is it to Detect a Dirty Bomb?

Realities

- For gamma sources – Cobalt and Cesium, for example – this is true.
- Alpha sources, like Americium, Plutonium, and Californium, can be shielded with a piece of paper
- As a result, source security is an even greater priority for alpha than for gamma sources

More to Explore

- Senate Committee on Foreign Relations Hearing Testimony on “Dirty Bombs and Basement Nukes”, March 2002.
- “Weapons of Mass Disruption”, Michael Levi and Henry Kelly, *Scientific American*, November 2002.
- “Dirty Bomb”, presented by PBS’s *Nova*, February 2003; rerunning March 25th and 26th.